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Numerical modeling of heavy oil displacement by hot water

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Abstract

© Research India Publications. Within the terms of considerable depletion and exhaustion of developed oil and gas reserves in the Republic of Tatarstan (RT), the substantiation of production volumes and the growth of hydrocarbon reserves is very relevant, and more attention is paid to highly viscious oils (HVO) and natural bitumen (NB) as the alternative sources of fuel and energy resources. The use of thermal methods for oil recovery increase is based on the ability of an oil reservoir to accumulate and transmit heat energy. Heat transfer is carried out mostly by heat conduction and convection. Water serves as a working agent at the application of thermal methods. Water carries more heat per unit mass than any other liquid. In this study, the numerical solution is presented concerning the problem of heavy oil with hot water displacement in the linear formulation. The paper describes a mathematical model and a physical process that occurs during the thermal impact on the oil-saturated during hot water injection into the reservoir with heavy oil. The key assumptions of the model and the methods of these equations solutions are specified. The analysis of numerical experiment allows you to suggest the possibility of using this method when an optimal method of heavy oil field development is seleceted.

Keywords

Heavy oils, Hot water injection, Influx stimulation, Modeling, Thermal methods of oil recovery enhancement, Viscosity dependence on temperature, Water saturation profiles